What is claimed is:

1. A clamping apparatus comprising:

a frame;

a plurality of clamping arms movably supported by the frame for grasping and releasing a load; and

an adjustable bushing mounted on the frame and guiding one of the clamping arms for translation with respect to the frame.

2. A clamping apparatus as claimed in claim 1 wherein the bushing can be moved towards or away from the one of the clamping arms by rotation of the bushing.

3. A clamping apparatus as claimed in claim 2 wherein the bushing is screwed into the frame and has an inner end for guiding the one of the clamping arms.

4. A clamping apparatus as claimed in claim 1 including a first adjustable bushing opposing an upper surface of the one of the clamping arms and a second adjustable bushing opposing a lower surface of the one of the clamping arms.

5. A clamping apparatus as claimed in claim 4 wherein each of the bushings slidably engages the one of the clamping arms.

6. A clamping apparatus as claimed in claim 4 including a third adjustable bushing and a fourth adjustable bushing opposing

opposite lateral sides of the one of the clamping arms.

7. A clamping apparatus as claimed in claim 1 wherein the bushing has a portion comprising plastic for slidably engaging the one of the clamping arms.

8. A clamping apparatus as claimed in claim 2 wherein the bushing includes a portion for engaging with a tool for rotating the bushing.

9. A clamping apparatus as claimed in claim 8 wherein the bushing includes a socket for receiving a wrench.

10. A clamping apparatus comprising:

a frame having a pair of tubular legs;

a pair of clamping arms each received in one of the legs for translation in a lengthwise direction of the legs;

a plurality of adjustable bushings for each leg, each bushing being screwed into one of the legs and having an inner end opposing and guiding one of the clamping arms.

11. A clamping apparatus as claimed in claim 10 wherein each bushing slidably engages one of the clamping arms.

12. A support arrangement comprising:

a first member;

a second member supported for translation by the second

member; and

an adjustable bushing adjustably mounted on the first member and slidably guiding the second member.

13. A support arrangement as claimed in claim 12 wherein the bushing can be moved towards or away from the second member by rotation of the bushing.

14. A support arrangement as claimed in claim 12 wherein the bushing has a portion comprising plastic for slidably engaging the second member.

15. A support arrangement comprising:

a first tube;

a second tube disposed inside the first tube and movable inside the first tube in a lengthwise direction of the first tube;

a plurality of bushings each screwed into a wall of the first tube and each having an inner end comprising plastic opposing the outer surface of the second tube, each bushing being rotatable in the first tube to adjust a distance of the inner end of the bushing from the outer surface of the second tube; and

a drive mechanism coupled to the second tube for translating the second tube with respect to the first tube in the lengthwise direction of the first tube.

16. A support arrangement as claimed in claim 15 wherein

each tube has a polygonal transverse cross section.

17. A clamping apparatus comprising:

a frame;

a plurality of clamping arms pivotably mounted on the frame, each clamping arm including a contact portion for contacting a load to be lifted, each clamping arm defining a four-bar linkage which controls an angle of the contract portion with respect to the vertical as the clamping arm pivots with respect to the frame; and

at least one drive mechanism connected to one of the clamping arms to pivot the one of the clamping arms with respect to the frame.

18. A clamping apparatus as claimed in claim 17 wherein the four-bar linkage comprises a parallel linkage which maintains the angle of the contact portion with respect to the vertical constant as the clamping arm pivots with respect to the frame.

19. A clamping apparatus as claimed in claim 17 wherein each clamping arm includes a lever portion pivotably connected to the frame and to the contact portion, and a control rod extending alongside the lever portion and pivotably connected to the frame and to the contact portion, the four-bar linkage comprising the lever portion, the control rod, a portion of the frame extending between the lever portion and the control rod, and a portion of the contact portion extending between the lever portion and the

control rod.

20. A clamping apparatus as claimed in claim 17 wherein a separation between the contact portions of two of the clamping arms opposing each other can change by at least 4 inches due to pivoting of at least one of the opposing clamping arms relative to the frame with an angle with respect to the vertical of each contact portion of the two opposing clamping arms changing no more than 2 degrees.

21. A clamping apparatus as claimed in claim 17 wherein a separation between the contact portions of two of the clamping arms opposing each other can change by at least 4 inches due to pivoting of at least one of the opposing clamping arms relative to the frame with an angle with respect to the vertical of each contact portion of the two opposing clamping arms changing no more than 1 degree.

22. A clamping apparatus as claimed in claim 17 wherein a separation between the contact portions of two of the clamping arms opposing each other can change by at least 4 inches due to pivoting of at least one of the opposing clamping arms relative to the frame with an angle with respect to the vertical of each contact portion of the two opposing clamping arms changing no more than 0.5 degrees.

23. A clamping apparatus as claimed in claim 17 wherein a

separation between the contact portions of two of the clamping arms opposing each other can change by at least 8 inches due to pivoting of at least one of the opposing clamping arms relative to the frame with an angle with respect to the vertical of each contact portion of the two opposing clamping arms changing no more than 2 degrees.

24. A clamping apparatus as claimed in claim 17 wherein a separation between the contact portions of two of the clamping arms opposing each other can change by at least 10 inches due to pivoting of at least one of the opposing clamping arms relative to the frame with an angle with respect to the vertical of each contact portion of the two opposing clamping arms changing no more than 2 degrees.

25. A clamping apparatus as claimed in claim 17 wherein the angle with respect to the vertical of the contact portion of any of the clamping arms varies by at most 2 degrees as a lower end of the contact portion travels by a horizontal distance of at least 6 inches as the clamping arm pivots with respect to the frame.

26. A clamping apparatus as claimed in claim 17 wherein the angle with respect to the vertical of the contact portion of any of the clamping arms varies by at most 2 degrees as a lower end of the contact portion travels by a horizontal distance of at least 8 inches as the clamping arm pivots with respect to the

frame.

27. A clamping apparatus comprising:

a frame;

a plurality of clamping arms pivotably mounted on the frame, each clamping arm including a lever portion pivotably mounted on the frame, a contact portion for contacting a load to be lifted pivotably mounted on the lever portion, and an adjustable-length rod extending alongside the lever portion and having a lower end pivotably connected to the contact portion, a change in the length of the rod changing an angle of the contact portion with respect to the lever portion; and

at least one drive mechanism connected to one of the lever portions to pivot the lever portion with respect to the frame.

28. A clamping apparatus comprising:

a frame;

two opposing clamping arms pivotably mounted on the frame, each clamping arm including a contact portion for contacting a load to be lifted, and

at least one drive mechanism connected to one of the clamping arms to pivot the one of the clamping arms with respect to the frame,

wherein a separation between the contact portions of the clamping arms can change by at least 4 inches due to pivoting of at least one of the opposing clamping arms relative to the frame with an angle with respect to the vertical of each contact

portion changing no more than 2 degrees when the contact portions are not contacting a load.

29. A method of using a clamping apparatus comprising grasping a load from a plurality of sides with the clamping apparatus of any one of claims 1 - 11 or 17 - 28.

30. A method as claimed in claim 29 wherein the load comprises a layer of items disposed on a pallet.

31. A method of using a clamping apparatus comprising grasping a load having a width which differs from its width by at least 4 inches from four sides with the clamping apparatus of claim 17, the angles of the inner surfaces of the contact portions of the clamping arms varying among the clamping arms by at most 2°.

32. A method as claimed in claim 31 wherein the width and the length of the load differ by at least 8 inches.

33. A method as claimed in claim 31 wherein the width and the length of the load differ by at least 10 inches.

34. A clamping arrangement comprising:

a lift truck; and

a clamping apparatus supported by the lift truck and having a pair of opposing clamping arms capable of relative movement

towards and away from each other to grasp or release an object, the clamping apparatus being pivotable about an axis with respect to the lift truck to adjust an angle of the clamping apparatus with respect to the horizontal, the angle of the clamping apparatus with respect to the horizontal being releasably fixable.

35. A clamping arrangement as claimed in claim 34 including a lateral support member extending laterally from the lift truck and supporting the clamping apparatus, and a connector connecting the clamping apparatus to the lateral support member.

36. A clamping arrangement as claimed in claim 35 wherein the lateral support member can translate with respect to the lift truck in a widthwise direction of the lift truck.

37. A clamping arrangement as claimed in claim 34 wherein the clamping apparatus includes a frame having a leg pivotably connected to the connector for pivoting about the axis, and the connector includes an adjustment bolt engaging the leg to releasably fix an angle of the leg with respect to the lift truck about the axis.

38. A clamping arrangement as claimed in claim 37 wherein the frame of the clamping apparatus is a cross-shaped frame with a plurality of legs, and one of the legs is pivotably connected to the connector.

39. A clamping arrangement as claimed in claim 38 wherein the frame has four legs, and the leg connected to the connector is longer than the other three legs.

40. A clamping arrangement comprising:

a lift truck;

a support member supported by the lift truck and extending away from the lift truck in a widthwise direction of the lift truck; and

a clamping apparatus supported by the support member and having a pair of opposing clamping arms capable of relative movement towards and away from each other to grasp or release an object, the clamping apparatus being pivotable about an axis with respect to the support member between a first position in which the clamping arms are disposed outboard of the axis in the widthwise direction of the lift truck and a second position in which the clamping arms are disposed forward of the axis in the fore-and-aft direction of the lift truck.

41. A clamping arrangement as claimed in claim 40 including a side shifter supported by the lift truck, and the support member comprises a portion of the side shifter which translates with respect to the lift truck.

42. A method of operating a clamping apparatus supported by a support member supported by a lift truck and extending away from the lift truck in a widthwise direction of the lift truck,

comprising pivoting the clamping apparatus with respect to the support member about an axis between a first position in which clamping arms of the clamping apparatus are disposed outboard of the axis in the widthwise direction of the lift truck and a second position in which the clamping arms are disposed forward of the axis in the fore-and-aft direction of the lift truck, and grasping an object with the clamping arms when the clamping apparatus is in one of the first and second positions.

43. A method as claimed in claim 42 wherein the support member comprises a portion of a side shifter supported by the lift truck, the support member being able to translate with respect to the lift truck in the widthwise direction of the lift truck.

44. A method of operating a clamping apparatus supported by a lift truck comprising pivoting the clamping apparatus with respect to the lift truck about an axis to adjust an angle of the clamping apparatus with respect to the horizontal, then securing the clamping apparatus against rotation about the axis, and then grasping a load with clamping arms of the clamping apparatus.

45. A method as claimed in claim 44 including pivoting the clamping apparatus about the axis so that a frame of the clamping apparatus supporting the clamping arms is parallel to a support surface supporting the load.

46. A method as claimed in claim 44 including pivoting a mast of the lift truck supporting the clamping apparatus to set the axis parallel to the support surface.

47. A method as claimed in claim 44 including securing the clamping apparatus against rotation about the axis with an adjustment bolt engaging a frame of the clamping apparatus.

48. A clamping arrangement comprising:

a clamping apparatus having a frame with a pair of opposing clamping arms mounted on the frame for movement towards and away from each other to grasp or release an object;

a lift truck;

a support member mounted on the lift truck and extending away from the lift truck and having an engaging portion in an outer end thereof; and

a connector connecting the support member to the clamping apparatus and comprising

a central wall,

first and second opposing walls extending from the central wall and pivotably connected to the frame of the clamping apparatus to permit the frame to pivot about a first axis to adjust an angle of the clamping apparatus with respect to the horizontal,

an adjustment bolt extending from the central wall and engaging the frame for fixing an angle of the frame with respect to the connector about the axis,

a third wall extending from the central wall on an opposite side of the central wall from the first and second walls and pivotably connected to the support member for pivoting with respect to the support member about a second axis transverse to the first axis between first and second positions, the third wall including first and second engaging portions respectively aligned with the engaging portion of the support member when the third wall is in the first or second position, respectively, and

a removable pin engageable with the engaging portion in the support member and whichever of the first and second engaging portions of the third wall is aligned therewith to releasably secure the third wall in its first or second position.

49. A clamping arrangement as claimed in claim 48 wherein each of the engaging portion in the support member and the first and second engaging portions comprises a hole.

50. A clamping arrangement as claimed in claim 48 wherein the connector includes a fourth wall extending from the central wall parallel to the third wall and having first and second engaging portions aligned with the first and second engaging portions in the third wall.

51. A clamping arrangement as claimed in claim 48 wherein the frame of the clamping apparatus is a cross-shaped frame with a plurality of legs, and one of the legs is pivotably connected to the connector.

52. A clamping arrangement as claimed in claim 51 wherein the frame has four legs, and the leg connected to the connector is longer than the other three legs.